REMARKS

This amendment and these remarks are responsive to the Office action dated April 2, 2002. Claims 1-19, 30-39, and 46-48 are pending in the application. In the Office action, the Examiner rejected all claims under 35 U.S.C. §§102, 103, and/or 112 as follows:

- Claims 1-19 were rejected under 35 U.S.C. § 112.
- Claims 30 and 46-48 were rejected under 35 U.S.C. § 102(b).
- Claims 1-19 and 31-39 were rejected under 35 U.S.C. § 103(a) as being unpatentable over various combinations of references.

In response, applicants have amended claims 1, 10, 30, and 35. Applicants respectfully request reconsideration of the application for the reasons set forth below.

Claim Rejections – 35 U.S.C. § 112

Applicants have amended claims 1 and 10 to overcome rejections under 35 U.S.C. § 112. Claim 1 was rejected as indefinite because the claim recited a conduit path "remaining open and unconstricted between successive non-contact deposition ...." Amended claim 1 is now directed to a system "wherein the system is configured to provide non-contact deposition of fluid aliquots having a volume of less than about 5 microliters per aliquot without closing or constricting the conduit path between the deposition of successive ones of the fluid aliquots." The art of record fails to teach or suggest this aspect of the invention. Claim 10 was rejected as indefinite because the claim recites a "tip portion" lacking antecedent basis. Applicants have amended claim 10 to depend from claim 8, rather than claim 1, in order to provide an antecedent basis for "the tip portion" and thus remove any confusion about the structural relationship of the proximal and distal ends. Applicants believe that amended claims 1 and 10 meet all requirements of 35 U.S.C. § 112 and should be allowed, as should claims 2-9 and 11-19, which depend from claim 1.

Claim Rejections – 35 U.S.C. § 102

The Examiner rejected claims 30 and 46-48 under 35 U.S.C. § 102(b) as being unpatentable over U.S. Patent No. 5,660,792 to Koike. Applicants have amended claim 30 to recite "at least eight dispense tips" instead of "N dispense tips," and to recite "plural fluid reservoirs" instead of "X number of fluid reservoirs, where X is in the range of 1 to N." Applicants also have added the conjunction "and" to clarify the connection between conditions "a" through "c" of the claim. Support for the limitation "at least eight dispense tips" is included, for example, in Figures 32, 33, and 39, and on page 50, lines 6-18. Furthermore, support for the recited relationship between the permitted conditions is included, for example, on page 48, lines 13-15.

Amended claim 30 is not anticipated by Koike because the cited reference does not teach a fluid dispensing system having at least eight dispense tips. Even if Koike were to include at least eight dispense tips, Koike does not teach the recited relationships of the pumps to the fluid reservoirs. In particular, Figure 5 of Koike shows piping system 25 in which solvent bottles M1-M6 are connected to syringe pumps 28A, 28B, and 28C using only one conduit, which extends upward in this figure from six-way selection valve 26. Koike also describes connecting syringe pump 28B to needle nozzle 13 for sample uptake. However, Koike does not teach or suggest a system permitting each pump to be connected to a separate fluid reservoir, as required by claim 30. For example, the three syringe pumps 28A, 28B, and 28C cannot be connected to three separate fluid reservoirs in the system of Koike. Therefore, even if the system of Koike were to include at least 8 dispense tips, each connected to a separate syringe pump, Koike would not teach or suggest the claimed invention. Accordingly, amended independent claim 30 should be allowed, as should its dependent claims, 31-34.

Independent claim 46 was also rejected as anticipated by Koike. However, this reference does not teach "a syringe pump having a linear motor," as recited. Instead, Koike describes "digital control syringe pumps," shown at 28A-C of Figure 5, which are "flow rate control pumps" (col. 7, lines 38-42). By his rejection, the Examiner suggests that Koike teaches a syringe pump having a linear motor, but Koike provides no information about any type of motor that may be operating the digital control syringe pumps, much less a linear motor. Instead, Koike specifies that the syringe pumps are "digital control," indicating only that an electronic interface is positioned between a user and the syringe pumps, not that a specific type of motor is used to operate the syringe pumps. Therefore, claim 46 should be allowed because Koike does not anticipate all elements of this claim. Similarly, dependent claims 47-48 should be allowed.

Claim Rejections – 35 U.S.C. § 103

The Examiner rejected claims 1-19 and 31-39 under 35 U.S.C. § 103(a) as being unpatentable over Koike in combination with U.S. Patent No. 5,853,894 to Brown, Patent No. 6,102,885 to Bass, Patent No. 6,121,048 to Zaffaroni et al., and/or Patent No. 6,207,031 to Adourian et al. Applicants traverse these rejections as described below.

Independent claim 1 was rejected over Koike in view of Zaffaroni et al. Applicants do not believe that it would have been obvious to combine the teachings of Koike with those of Zaffaroni et al. to achieve the claimed invention. Koike relates to a solid phase extraction device for automated sample processing. The device includes a fluid delivery system having syringe pumps 28A-C with a fluid capacity sufficient to deliver dilution volumes of solvent into test tubes. Zaffaroni relates to a device for forming an array of sample cells 712-714 on a substrate 704 by delivering nanoliter volumes of fluid at precise positions on the surface of the substrate. It would not have been obvious to combine these references because they describe distinct types of

sample repositories having distinct uses. The test tubes of Koike are designed to provide walls that separate samples and maintain the samples as separate during subsequent individual processing steps. The substrate of Zaffaroni et al. lacks walls, to permit high density deposition and co-processing of a large number of samples. Therefore, it would not have been obvious to modify a system that dilutes samples in test tubes using a substrate-targeted fluid dispensing system to provide non-contact deposition of fluid aliquots.

However, in the interest of expediting prosecution, applicants have amended claim 1 to recite "a positive displacement pump connected to the fluid source." Support for such a pump is included, for example, on page 52, lines 2-4. Neither Koike nor Zaffaroni et al., either alone or in combination, teach or suggest a system having a positive displacement pump and being configured to provide non-contact deposition of fluid aliquots having a volume of less than about 5 microliters per aliquot without closing or constricting the conduit path, as required by amended claim 1. Koike relates to a fluid dispensing system, which the Examiner admits "does not recite the limitations of depositing less than 5 microliters." By contrast, the Examiner states that Zaffaroni et al. teaches non-contact dispensing of fluid volumes of approximately 5 nanoliters. However, Zaffaroni et al. does not teach a pump having all the limitations of claim 1.

The pumps listed by Zaffaroni et al. include a "Nanoliter injector," an electrophoretic pump, an osmotic pump, and a piezoelectric pump. None of these pumps operate by positive displacement to provide non-contact deposition without closing or constricting the conduit path, as required by claim 1. Zaffaroni et al. describes the Nanoliter injector as a system for delivering nanoliter volumes of liquid (col. 17, lines 4-6). However, applicants believe that the Nanoliter injector is not capable of the non-contact deposition recited by amended claim 1. Instead, as suggested by the word "injector" in its name, the Nanoliter injector is configured to inject

samples/reagents directly into cells, particularly Xenopus oocytes. Accordingly, the Nanoliter injector relies on contact, with a sample or sample holder, to dispense small volumes. Without this contact, applicants believe that the Nanoliter injector cannot deposit fluid aliquots. At least two of the other pumps listed by Zaffaroni et al., the electrophoretic and osmotic pumps, do not operate by positive displacement. A positive displacement pump is a pump that moves fluid from a fluid compartment by reducing the volume of the compartment. By contrast, the electrophoretic and osmotic pumps maintain a constant size of fluid compartment while providing an electrical or osmotic driving force for fluid movement. Finally, the piezoelectric (or magnetostrictive) pump does not operate without closing or constricting a fluid contact, as required by claim 1. Instead, the piezoelectric pump constricts the fluid conduit, thus creating vibration that separates and dispenses fluid aliquots. Therefore, none of the pumps mentioned by Zaffaroni et al. meets all the limitations of claim 1. Accordingly, neither reference, either alone or in combination, teaches or suggests the claimed invention. Independent claim 1 and dependent claims 2-19 should be allowed.

Independent claim 35 was rejected over Koike in view of Zaffaroni et al. based on reasoning similar to that outlined above. Accordingly, applicants believe that claim 35 is allowable in its current form because it would not have been obvious to combine these references, as discussed above. However, to further prosecution, applicants have amended claim 35 to recite "a syringe pump device" and fluid aliquots that separate "without contacting the sample or the sample holder." Support for a syringe pump device is included, for example, on page 41, lines 12-16, and support for separation without contact with the sample or the sample holder is included, for example, on page 42, lines 8-10.

Neither reference, either alone or in combination, teaches or suggests a system having a syringe pump device and capable of separating of fluid aliquots without contact with the sample or the sample holder. For example, at least the osmotic, electrophoretic, and piezoelectric pumps are not syringe pumps, and the Nanoliter injector of Zaffaroni et al. relies on contact with the sample, as stated above. Accordingly, independent claim 35 and dependent claims 36-39 should be allowed.

Claim 5 was rejected as being unpatentable over a combination of Koike, Zaffaroni et al., and Brown et al. This claim requires a dispenser assembly that has a hydrophobic tip portion made of a heat-shrinkable material. The Examiner states that Brown teaches a hydrophobic coating. However, Brown does not teach or suggest the hydrophobic coating being heat-shrinkable. Therefore, for this additional reason, claim 5 should be allowed.

Claim 7 was rejected as being unpatentable over a combination of Koike, Zaffaroni et al., and Bass. This claim recites "a tip portion made of sapphire." Bass relates to a device for removing fat from a person's body. The device includes a sapphire tip that heats fat to facilitate its fluid movement during suction into the device. The Examiner asserts that it would have been obvious to add the sapphire tip of Brown to a fluid dispensing system produced by combination of Koike and Zaffaroni in order to "allow for heating a fluid which is being dispensed from the tip." Applicants suggest that it would not have been obvious to combine a heating element from a suction device immersed in fat (Bass) with a device for dispensing nanoliter volumes of fluid (Koike/Zaffaroni et al). The devices are moving fluid in opposing directions. Furthermore, it would not have been obvious that heating would provide any benefit for dispensing fluid aliquots by promoting rapid evaporation of the small volumes before they are dispersed. Therefore, it

would not have been obvious to combine the teachings of Koike, Zaffaroni et al., and Bass. For these additional reasons, claim 7 should be allowed.

Conclusion

Applicants believe that this case is now in condition for allowance, in view of the amendments and remarks above. If a telephone interview would in any way advance prosecution of the application, please contact the undersigned attorney.

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Box AMENDMENT FEE, Commissioner for Patents, Washington, D.C. 20231, on September 3, 2002.

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Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims

The claims have been amended as follows (material to be inserted is in **bold and underlined**, material to be deleted is in [~~brackets and strikeout~~]):

1. A system for delivering fluid to a sample holder comprising

a fluid source,

a **positive displacement** pump connected to the fluid source,

a dispenser assembly having an orifice, and

a conduit path extending from the pump to the orifice of the dispenser assembly,

wherein the system is configured to provide [~~the conduit path remaining open and unconstricted between successive~~] non-contact deposition of fluid aliquots having a volume of less than about 5 microliters per aliquot **without closing or constricting the conduit path between the deposition of successive fluid aliquots**.

10. The system of claim **8** [~~1~~], wherein the pump is connected to the dispenser assembly by a tube having a distal end, the tip portion having a flange on a proximal end, the distal end of the tube being held in contact with the flange of the tip portion.

30. A fluid dispensing system comprising

an array of [N] **at least eight** dispense tips, each dispense tip being connected to a separate syringe pump,

a fluid source bank, the fluid source bank having [X number of] **plural** fluid reservoirs, [where X is in the range of 1 to N,] and

a changeable fluid conduit network capable of permitting: (a) each **of at least eight of the** pumps to be connected to a separate fluid reservoir, (b) each **of at least eight of the** pumps

to be connected to the same fluid reservoir, and (c) any subset of pumps to be connected to the same fluid reservoir while one or more other [tips] **pumps** are connected to another fluid reservoir.

35. A device for dispensing fluid to a sample or sample holder, the device comprising

a fluid reservoir,

a **syringe** pump device connected to the fluid reservoir, and

a dispense element operatively connected to the pump device, wherein the pump device drives fluid incrementally to the dispense element with sufficient velocity and acceleration so that a fluid aliquot of less than about five microliters separates from the dispense element without contacting **the sample or the sample holder** [~~a surface~~].